

<http://www.cisco.com/warp/public/131/3.html>), albeit with the disadvantage that the group must be manually configured.

The invention therefore addresses the problem of specifying an improved method for managing a group of network access servers.

According to the invention, this is achieved by means of a method of the type cited at the beginning, wherein: ~~the logging on/off of a network access server to or from this group takes place in such a way that an address list of a network access server always indicates the current status of the network access servers in the group.~~

~~Since an address list is always updated when a network access server logs on/off, a configuration of the group of network access servers is essentially simplified for the operator of a packet data network. Various methods can be applied in this case, and these are cited in the dependent claims.~~

~~It is particularly advantageous if,~~

- when a new network access server logs onto a group of network access servers, a first message is sent from the new network access server to the network access servers of this group,
- the network access servers of this group store the address of the new network access server in an address list and send a second message to the new network access server in each case,
- the second messages are received and used by the new network access server for creating and storing an address list of all network access servers in this group.

~~This variant of the claimed method is particularly easy to implement and therefore particularly advantageous. This is a particularly easy-to-implement and therefore advantageous method for managing a group of network access servers, by means~~

of which an address list of a network access server always has the latest status of the network access servers within the group of the method according to the invention. In this case, a first message of the new network access server is followed by second messages of the network access servers of a group. Since the messages contain the addresses of the senders, it is advantageously possible to establish address lists in the network access servers, both in the new network access server and in the network access servers of the group.

It is also advantageous if

- a repetition time is assigned to a network access server in the group, said repetition time specifying the time intervals at which a the second message is sent from the network access server in a periodically recurring manner to the other network access servers in the group, and
- the network access server is deleted from the address lists of the other network access servers in this group if the second message is not received by them before the expiry of the repetition time.

As part of this activity, a check advantageously determines whether a network access server is actually still a member of the group of network access servers, or whether a connection to this server has failed due to a technical problem, for example. If this is the case, the relevant network access server is deleted from the address lists of the other network access servers.

It is beneficial to provide a method in which

- the repetition time is contained in the first message, and
- this repetition time is stored in a list by the network access servers of this group when a new network access server logs on.

In this variant, the repetition time is therefore directly transferred from the new network access server to the group of network access servers when it logs on. The network access servers save the repetition time in succession in a list, and can advantageously begin to monitor the arrival of a second message immediately. In this case, it is conceivable to use a separate list or a dedicated column in the address list.

It is also beneficial if, instead of the second message, a fourth message is provided for the periodically recurring notification. In this case, a second message is still used for the logon procedure, but a fourth message which is independent of the logon procedure is used in order to check whether a network access server is actually still a member of the group of network access servers or whether e.g. a connection to this server has failed due to a technical problem. This is advantageous in order to separate the individual method sections more effectively in relation also to the messages.

An advantageous variant of the invention also includes a method

- in which a third message is sent by one network access server in the group to the other network access servers in the group and
- in which the other network access servers in this group delete this network access server from their address lists when they receive this message.

In this way, a network access server can be logged off from the group actively, i.e. not merely as a result of the absence of a second message. This advantageously avoids possible misunderstandings as to whether the absence of a second message is due to an error or is intentional for the purpose of logging off a network access server.

It is advantageous if a distribution list address is used for sending the first and/or second and/or third messages and the

fourth messages within the group of network access servers, said distribution list address including addresses of at least all network access servers in this group, wherein a message contains an identification of the group.

The distribution list address therefore includes at least all potential members of a group. It is also conceivable for different groups to use the same distribution list address, and therefore the recipients of a message analyze a group identification which is transferred at the same time. In this case, it is advantageous for the operator of a packet data network that only limited resources are required for the configuration of the network.

The problem addressed by the invention is also solved by means of a network access server which includes

~~— includes means for linking into a group of network access servers, wherein the "Multichassis Multilink Point to Point Protocol" (MMP) is used within said group,~~
~~— includes an address list of the other network access servers in this group, and~~
~~— includes means for registering a logging on and/or off of another network access server to or from this group, such that an address list in the network access server always shows the current status of the network access servers which are in the group.~~

~~Since an address list is continuously updated when a network access server logs on and/or off, configuring the group of network access servers is greatly simplified for the operator of a packet data network. It should be noted at this point that the advantages which are cited in relation to the claim method apply equally to the claimed network access server and vice versa.~~

~~In this case, it is particularly advantageous if the network access server includes~~

- means for receiving a first message, which message indicates the logging-on of a new network access server to a group of network access servers,
- means for storing an address of the new network access server in an address list, wherein the address is contained in the first message,
- means for sending a second message to the new network access server, and
- means for receiving second messages and means for generating and storing an address list of all network access servers in a group, wherein the addresses are contained in the second messages.

~~This variant of the invention is particularly easy to implement and therefore particularly advantageous.~~ The network server according to the invention therefore enables the particularly easy-to-implement and therefore advantageous inventive method for managing a group of network access servers. In this case, a network access server comprises means for transferring the local address to the network access servers in a group, and means for establishing address lists of the other network access servers in a group.

It is advantageous to provide a network access server which includes

- means for the periodically recurrent sending of a second message to the other network access servers in the group,
- means for storing a repetition time which is assigned to a network access server,
- means for monitoring whether a second message of a network access server was received before the expiry of the repetition time which was assigned to it, and
- means for deleting a network access server from an address list.

In this context, the network access server advantageously includes elements for checking whether a network access server is actually still a member of the group of network access servers or whether e.g. a connection to this server has failed due to a technical problem. Said network access server also includes means for continuously indicating its active participation to the other network access servers.

Claims

1. A method for managing a group of network access servers (ZS1, ZS2, ..., ZSN) within which group the "Multichassis Multilink Point-to-Point Protocol" (MMP) is used, wherein an address list of the other network access servers in this group (ZS1, ZS2, ..., ZSN) is managed by each network access server in this group (ZS),

characterized in that

- when a new network access server (ZSN+1) logs onto a group of network access servers (ZS1, ZS2, ..., ZSN), a first message (N1) is sent from the new network access server (ZSN+1) to the network access servers of this group (ZS1, ZS2, ..., ZSN),
- the network access servers of this group (ZS1, ZS2, ..., ZSN) store the address of the new network access server (ZSN+1) in an address list and send a second message (N21, N22, ..., N2N) to the new network access server (ZSN+1) in each case,
- the second messages (N21, N22, ..., N2N) are received and used by the new network access server (ZSN+1) for creating and storing an address list of all network access servers in this group (ZS1, ZS2, ..., ZSN).

2. The method as claimed in claim 1,

characterized in that

- a repetition time (TW) is assigned to a network access server in the group (ZS), said repetition time specifying the time intervals at which the second message (N2) is sent from the network access server (ZS) in a periodically recurring manner to the other network access servers (ZS1, ZS2, ..., ZSN+1) in the group, and
- the network access server (ZS) is deleted from the address lists of the other network access servers (ZS1, ZS2, ..., ZSN+1) in this group if the second message (N2) is not

received by them before the expiry of the repetition time (TW) .

3. The method as claimed in claim 1 and 2, characterized in that

- the repetition time (TWN+1) is contained in the first message (N1), and
- this repetition time (TWN+1) is stored in a list by the network access servers of this group (ZS1, ZS2, ..., ZSN) when a new network access server (ZSN+1) logs on.

4. The method as claimed in one of the claims 2 or 3, characterized in that, instead of the second message (N2), a fourth message is provided for the periodically recurring notification.

5. The method as claimed in one of the claims 1 to 4, characterized in that

- a third message (N3) is sent by a network access server (ZSN) in the group to the other network access servers (ZS1, ZS2, ..., ZSN+1) in the group, and
- the other network access servers (ZS1, ZS2, ..., ZSN+1) in this group delete this network access server (ZSN) from their address lists when they receive this message (N3).

6. The method as claimed in one of the claims 1 to 5, characterized in that

a distribution list address is used for sending the first and/or second and/or third messages (N1, N2, N3) and the fourth messages within the group of network access servers (ZS1, ZS2, ..., ZSN+1), said distribution list address including addresses of at least all network access servers in this group (ZS1, ZS2, ..., ZSN+1), wherein a message contains an identification of the group (GI).

7. A network access server (ZS) which includes means for linking into a group of network access servers (ZS1, ZS2, ..., ZSN), the "Multichassis Multilink Point-to-Point Protocol" (MMP) being used within said group, wherein this network access server (ZS) includes an address list of the other network access servers in this group (ZS1, ZS2, ..., ZSN), characterized in that

- it includes means for receiving a first message (N1) which indicates the logging on of a new network access server (ZSN+1) to a group of network access servers (ZS1, ZS2, ..., ZSN),
- it includes means for storing an address of the new network access server (ZSN+1) in an address list, wherein the address is contained in the first message (N1),
- it includes means for sending a second message (N2) to the new network access server (ZSN+1), and
- it includes means for receiving second messages (N21, N22, ..., N2N) and means for generating and storing an address list of all network access servers in a group (ZS1, ZS2, ..., ZSN), wherein the addresses are contained in the second messages (N21, N22, ..., N2N).

8. The network access server (ZS) as claimed in claim 7, characterized in that

- it includes means for the periodically recurrent sending of a the second message (N2) to the other network access servers in the group (ZS1, ZS2, ..., ZSN),
- it includes means for storing a repetition time (TW) which is assigned to a network access server (ZS),
- it includes means for monitoring whether a the second message (N2) of a network access server (ZS) was received before the expiry of the repetition time (TW) which was assigned to it, and
- it includes means for deleting a network access server (ZS) from an address list.